REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188





| 2. REPORT DATE | 3. REPORT TYPE AND DATES COVERED |
|---|---|
| 01/92 | POP Test (11/91) |

**4. TITLE AND SUBTITLE**
Performance Oriented Packaging Testing of Wood Box, Shipping and Storage, PPP-B-601, for PHOENIX Rocket Motor for Packing Group II Solid Hazardous Materials

**5. FUNDING NUMBERS**

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**8. PERFORMING ORGANIZATION REPORT NUMBER**
DODPOPHM/USA/DOD/NADTR91030

**9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)**
Commander, Naval Air Systems Command
(AIR-41821B)
Department of the Navy
Washington, DC 20361-8050

**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**
Same as above

**11. SUPPLEMENTARY NOTES**
N/A

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**13. ABSTRACT** *(Maximum 200 words)*

Qualification tests were performed to determine whether the in-service PPP-B-601 Shipping and Storage Wood Box for PHOENIX Rocket Motor could be utilized to contain properly dunnaged solid type hazardous materials weighing up to a gross weight of 322 kg (710 pounds). The tests were conducted in accordance with Performance Oriented Packaging (POP) requirements specified by the United Nations Recommendations on the Transportation of Dangerous Goods, ST/SG/AC.10/1 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178. The wood box has conformed to the POP performance requirements; i.e., the wood box successfully retained its contents throughout the specified tests.





**14. SUBJECT TERMS**
POP Test of PPP-B-601 Shipping and Storage Wood Box for PHOENIX Rocket Motor

**15. NUMBER OF PAGES**
5

**16. PRICE CODE**

| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT |
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# PERFORMANCE ORIENTED PACKAGING TESTING OF WOOD BOX, SHIPPING AND STORAGE, PPP-B-601 FOR PHOENIX ROCKET MOTOR FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS

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January 1992

**FINAL**

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Sponsoring Organization:
Naval Air Systems Command
(Code AIR-41821B)
Washington, DC 20361-8050

## INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the PPP-B-601 Shipping and Storage Wood Box (Packing Group II) meets the requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The box contents consisted of one inert rocket motor section weighing 211 kg (465 pounds), and an additional 16 kg (35 pounds) of sand. Gross weight of the loaded box was 322 kg (710 pounds). Due to unavailability only one box was available for testing. This is less than the number required by the regulations. Approval for this deviation has been granted by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

## TESTS PERFORMED

### 1. Base Level Vibration Test

This test shall be performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. The box shall be placed on a repetitive shock platform which has a vertical linear motion of 1-inch double amplitude. Movement of the boxes shall be restricted during vibration in all but the vertical direction. The frequency of the platform shall be increased until the box leaves the platform 1/16 of an inch at some instant during each cycle. Test time shall be 1 hour.

### 2. Stacking Test

This test shall be performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. The box shall be subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a height of 3 meters (including the test box). A weight of 1,361 kg (3,000 pounds) shall be stacked on the test box. The test shall be performed for 24 hours. The weight shall then be removed and the container examined.

### 3. Drop Test

This test shall be performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Five drops shall be performed from a height of 1.2 meters (4 feet), impacting the following surfaces:

a. Flat bottom.

b. Flat top.

c. Flat on long side.

d. Flat on short side.

e. One corner.

## PASS/FAIL

### 1. Base Level Vibration Test

The criteria for passing the base level vibration test is outlined in Title 49 CFR, Sec. 178.608(c): "A packaging passes the vibration test if there is no rupture or leakage from any of the packages."

### 2. Stacking Test

The criteria for passing the stacking test is outlined in Title 49 CFR, Sec. 178.606(d): "No test sample may leak. In composite packagings or combination packagings, there must be no leakage of the filling substance from the inner receptacle, or inner packaging. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength or cause instability in stacks of packages.

### 3. Drop Test

The criteria for passing the drop test is outlined in Title 49 CFR, Sec. 178.603(f): A package is considered to successfully pass the drop tests if for each sample tested--

(1) For removable head drums for solids, the entire contents are retained by an inner packaging (e.g., a plastic bag) even if the closure on the top head of the drum is no longer sift-proof;

(2) For a composite or combination packaging, there is no damage to the outer packaging likely to adversely affect safety during transport, and there is no leakage of the filling substance from the inner packaging;

(3) For a drum, jerrican or bag, any discharge from a closure is slight and ceases immediately after impact with no further leakage;

(4) For packagings for explosives, no rupture of the packaging occurs.

## TEST RESULTS

### 1. Base Level Vibration Test

Satisfactory.

### 2. Stacking Test

Satisfactory.

### 3. Drop Test

Satisfactory.

## DISCUSSION

### 1. Base Level Vibration Test

Immediately after the vibration test was completed, the box was removed from the platform, turned on its side and observed for evidence of leakage. No leakage was observed.

### 2. Stacking Test

The box was visibly checked after the 24-hour period was over. No leakage, distortion, or deterioration was observed.

### 3. Drop Test

After each drop, the box was inspected for evidence of leakage. No leakage was observed.

## REFERENCE MATERIAL

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6.

B. Code of Federal Regulations, Title 49 CFR, Parts 107 through 178.

C. Bureau of Explosives Tariff No. BOE 6000K Hazardous Materials Regulations of the Department of Transportation by Air, Rail, Highway, Water including Specifications for Shipping Containers.

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## TEST DATA SHEET

| | |
|---|---|
| **DATA SHEET:** | |
| **Container:** PPP-B-601 Shipping and Storage Wood Box for PHOENIX Rkt Mtr | |
| **Type:** 4D | **Container P/N or NSN:** |
| **Specification Number:**<br>PPP-B-601 | **Material:**<br>Wood |
| **Gross Weight:**<br>322 kg (710 pounds) | **Dimensions:**<br>74" L x 25-3/4" W x 29-1/2" H |
| **Closure (Method/Type):**<br>16 clips and banding | **Tare Weight:**<br>95 kg (210 pounds) |
| **Additional Description:**<br><br>Banding (3/4" strap), 3 places | |
| **PRODUCT:** | |
| **Name:** See table | **NSN(s):** See table |
| **United Nations Number:** See table | |
| **United Nations Packing Group:** II | |
| **Physical State (Solid, Liquid, or Gas):** Solid | |
| **Vapor Pressure (Liquids Only):** N/A **At 50 °C:** N/A **At 55 °C:** N/A | |
| **Consistency/Viscosity:** N/A | **Density/Specific Gravity:** N/A |
| **Amount Per Container:** | **Flash Point:** N/A |
| **Net Weight:** See table | |
| **TEST PRODUCT:** | |
| **Name:** Rocket Motor and 35 pounds of sand | **Physical State:** Solid |
| **Consistency:** N/A | |
| **Density/Specific Gravity:** N/A | |
| **Test Pressure (Liquids Only):** N/A | |
| **Amount Per Container:** N/A | **Net Weight:** 227 kg (500 pounds) |

TABLE 1
PPP-B-601 Shipping and Storage Wood Box for PHOENIX Rocket Motor

| NALC | NSN | Type | Packing Drawing | UN Code | UN Number | #/ Cntr | Weight (lb) |
|---|---|---|---|---|---|---|---|
| V885 | 1337-01-135-6910 | Rocket Motor | RK392A00041 | 1.3C | 0186 | 1 | 465 |
| V887 | 1337-01-272-2172 | Rocket Motor | RK392A00041 | 1.3C | 0186 | 1 | 465 |

NOTE: The container is qualified for a maximum net weight of 500 pounds.

# PPP-B-601 SHIPPING AND STORAGE WOOD BOX FOR PHOENIX ROCKET MOTOR

## POP MARKING

## UN 4D/Y322/S/**/USA/DOD/NAD

** YEAR LAST PACKED OR MANUFACTURED

Encl (2)